Executive Summary

THE NEED FOR STANDARDIZED ELECTRONIC COMMERCE

The increased computerization of our society is triggering major changes in the organization of work. Paper-driven processes are being reengineered to capture the benefits of doing business electronically. Businesses are implementing electronic commerce (EC) to meet the imperatives of an increasingly competitive world. These trends in the economy at large are being mirrored in the Federal government by many individual agency actions as well as the cross-cutting National Performance Review (NPR). The "carrot" of increased productivity and effectiveness is being reinforced by the "stick" of an increasingly limited Federal budget.

Recognizing the advantages of electronic commerce, some agency managers have implemented portions of it into their operations. They found that they had to design processes and procedures from scratch, and in so doing, each organization created a version slightly different from that of other organizations. Compounding this problem, the trading partners often have to deal with a new way of doing business for each organization. The Federal government must move quickly to standardize its move to electronic commerce before a deluge of ad hoc implementations makes progress more difficult. The President has directed that the implementation of electronic commerce be accelerated across the Executive Branch of the Federal government and that a standard architecture for electronic commerce be developed for the acquisition function by March 1994.

The recommended architecture and underlying rationale consists of the following fundamental components:

- A single means of supplier registration to do business electronically with the Federal government including a standardized trading partner agreement embodying the "rules of the road"
- A standard method of implementing the electronic data interchange (EDI) transaction formats used in the United States [currently those approved by the American National Standards Institute (ANSI) Accredited Standards Committee(ASC) X12]

- Existing agency-managed procurement systems modified to generate standard EDI ASC X12 transactions (i.e., agencies would modify their existing systems to feed data in "flat file format" to a commercial off-the-shelf software package called a translator that generates the ASC X12 transaction)
- A "virtual network" connecting agency standardized transactions to facilities where value-added networks (VANs) or other entities can access them
- A standard agreement between the government and the VANs that support the government and its trading partners
- A standards-based system that gives agency procurement staff access to government data bases supporting their operations
- The use of electronic funds transfer (EFT) as the principal method of payment and the development of a supportive EFT architecture.

These and additional elements are discussed in greater detail below.

THE INFORMATION AGE IS UPON US

This document presents a new approach to the process of government acquisition — one that will benefit both the government and its suppliers. We use the term "electronic commerce" to describe the standards, practices, and technologies that constitute the new approach. In this document, we describe the architecture for electronic commerce in Federal acquisition and recommend actions the executive departments and agencies should take to implement electronic commerce and meet President Clinton's mandated schedule.

Each day we face new technological realities that we could only imagine yesterday: a national information infrastructure, the information superhighway with on-ramps and off-ramps in every home, and more. Each day it seems we must change our behavior and adapt to such new information-dominated technologies as automatic teller machines, debit cards, the Internet, and interactive television. In moving to the information age, humankind is putting itself through a technological revolution reminiscent of shifts from hunting and gathering to agriculture and from an agrarian economy to a manufacturing one.

Today's shift is as profound as those that presaged major transitions in the past. It is a shift from a culture that organizes and regulates its society around modeling, recording, managing, and maintaining its fundamental business processes in paper document form. In contrast, the information age is a shift to a culture in which information technologies will make every form of humanly intelligible information available globally, instantaneously, inexpensively, and where and in whatever form individuals need.

The global business community has already embraced the latest revolution. It needs the new technologies to stay healthy and grow in the competitive marketplace whose imperatives are defined by those who exploit information and other technologies. Members of the global business community refer to its new ways of doing business as "electronic commerce." EC includes the application of national and international standards, business practices, and various information technologies. Representative aspects of EC include EFT, EDI, fax, and remote bulletin boards.

Government institutions have often lagged in adopting new information technologies. However, the government must now embrace the information age to meet reduced budgets, increased missions, and an increasing internal and external awareness that things can and ought to be done differently. That awareness is, in part, the genesis of the Administration's ongoing National Performance Review.

NATIONAL PERFORMANCE REVIEW

The NPR began on March 3, 1993, when President Clinton announced an intensive 6-month review of the Federal government. It seeks to create a government that works better and costs less. The NPR was performed by a team of experienced Federal employees from all corners of the government. Their report[1] is but the first product of a continuing commitment to change. In that report, they describe roughly 100 actions and recommendations they consider most imperative to improve government.

The NPR report specifically identifies major, readily obtainable savings that will result from systematic reform of the Federal

[1] Vice President Al Gore, *From Red Tape to Results, Creating a Government That Works Better & Costs Less,* Report of the National Performance Review, September 7, 1993.

government's acquisition process. Acquisition is a highly complex process through which all the products and services the government consumes — about $200 billion each year — are acquired.

Using EC to reform the acquisition process has benefits for both the government and its suppliers. Benefits for the government include the following:

- Lower prices
- Increased competition
- Increased buyer productivity
- Better management information
- Reduced acquisition times and costs
- Better inventory control.

The following are among the benefits for suppliers:

- Improved profitability and cash flow
- Increased opportunity to participate in government acquisition
- Increased operating efficiencies
- Improved payment process.

PRESIDENT'S MEMORANDUM

In a memorandum of October 26, 1993,[2] President Clinton noted that moving to an EC system to simplify and streamline the acquisition process will promote customer service and cost-effectiveness. The electronic exchange of acquisition information between the private sector and the Federal government (i.e., the use of EC) will increase competition. It will do so by improving access to Federal contracting opportunities for the more than 300,000 suppliers currently doing business with the Federal government, particularly small businesses and many other suppliers who find access to bidding opportunities difficult under the current system.

[2] *Federal Register* / Vol. 58, No. 207 / Thursday, October 28, 1993, 58095 / Presidential Documents, Memorandum of October 26, 1993, "Streamlining Procurement Through Electronic Commerce," Memorandum for the Heads of Executive Departments and Agencies [and] the President's Management Council.

To these ends, the President set forth the following objectives for EC:

- Exchange acquisition information electronically between the private sector and the Federal government to the maximum extent practicable
- Provide businesses, including small, small disadvantaged, and women-owned businesses, with greater access to Federal acquisition opportunities
- Ensure that potential suppliers are provided simplified access to the Federal government's EC system
- Employ nationally and internationally recognized data formats that serve to broaden and ease the interchange of data3
- Use agency and industry systems and networks to enable the government and potential suppliers to exchange information and access Federal acquisition data.

To implement EC and to achieve his objectives for EC, the President set forth the following four milestones:

- By March 1994, define the architecture for the government-wide EC acquisition system and identify executive departments or agencies responsible for developing, implementing, operating, and maintaining the Federal electronic system
- By September 1994, establish an initial EC capability to enable the Federal government and private suppliers to electronically exchange standardized requests for quotations (RFQs), quotes, purchase orders, and notice of awards and begin government-wide implementation
- By July 1995, implement a full-scale Federal EC system that expands initial capabilities to include electronic payments, document interchange, and supporting data bases
- By January 1997, complete government-wide implementation of EC for appropriate Federal purchases, to the maximum extent possible.

[3] The Federal government supports a recent ASC X12 initiative to align itself with UN/EDIFACT. In that regard, we will continue to participate in both the ASC X12 and UN/EDIFACT standards-making processes and will migrate to the use of UN/EDIFACT when it is feasible and practical to do so, consistent with the capabilities and migration patterns of our trading partners. (ASC X12 refers to American National Standards Institute Accredited Standards Committee X12 standard which provides the design rules for electronically exchanging business information. ASC X12 is a national standard. EDIFACT refers to the United Nations EDI for Administration, Commerce and Transport [UN/EDIFACT — International Standards Organization 9735] standard. EDIFACT is an international standard for exchanging business information.)

This schedule is aggressive; despite that, the President noted that it should be accelerated where practicable.

THE PRESIDENT'S MANAGEMENT COUNCIL ELECTRONIC COMMERCE TASK FORCE

The President's Management Council (PMC) established a task force to implement EC within the Federal government as directed by the President's memorandum. The task force is chaired by the Administrator, Office of Federal Procurement Policy (OFPP) with membership from the major Federal departments and agencies, Small Business Administration, and Small Agency Council.

THE FEDERAL ELECTRONIC COMMERCE ACQUISITION TEAM

In order to complete the first task of the President's memorandum, the OFPP chartered[4] a Federal Electronic Commerce Acquisition Team (ECAT) and directed it to develop a comprehensive plan for implementing an EC capability within 120 days.

The OFPP defined the initial capability as a standardized EC capability for acquisition[5] to be implemented throughout the Federal government. In consultation with ECAT, the OFPP Administrator agreed that focusing the initial capability on small purchases for commercial products would facilitate implementation.

MEETING THE PRESIDENT'S DIRECTIVE

THE BUSINESS CASE - THE NECESSARY PARADIGM

Government traditionally manages those business functions related to the acquisition process as a series of independent and unrelated activities. However, current market forces are so compelling that we can no longer accept worn-out variations of the same basic approach. Clearly, we must adopt a new business model, a paradigm shift, treating our overall acquisition operation as an "extended enterprise." We must adopt a process view of all the acquisition elements, cross traditional boundaries, and manage the entire operational flow from start to finish. In so doing we seek

[4] Charter for Federal Electronic Commerce Acquisition Team, January 3, 1994.

[5] Hereafter in this report, we use the term "acquisition" to include the closely related terms of "procurement" and "finance."

to enhance our customer relationships, achieve leverage in the marketplace, reduce costs and the need to retain large inventories, and obtain faster and more reliable deliveries of materials and services.

We draw heavily from industry's experience to enforce our position on change. We must channel our efforts through business process reengineering while retaining a focus on our core competencies. Automation alone is not sufficient. We must use information technology as the "engine" to drive our initiatives to streamline and transform relationships with both our customers and suppliers or trading partners.

THE INTEGRATED ORGANIZATION

Our vision for Federal government acquisition focuses on process simplification through the reworking of paper-oriented processes to be more efficient. That simplification will require us to eliminate steps that the use of automation technology has made unnecessary. We need to look at the value of old rules and safeguards in light of the new technology. We recognize the need to, and the value of, dynamically linking the various processes of requisitioning, buying, transporting, receiving, paying for, and managing material and services as the means for achieving the quality imperative: to do everything in the Federal government smarter, better, faster, and more cost-effectively.

Integration involves three aspects. First, we must review and improve our processes and enhance these improvements by using technology where appropriate. Second, we must integrate across the improved business functions. In doing so, we carefully identify the information needs for each process. Third, we must integrate common business functions, application program interfaces, and data bases across executive departments and agencies. That integration will ensure department and agency users have access to common data bases that are government-wide, shared, relational, and distributed rather than having to rely on "stovepipe" data bases that are specific and proprietary, with complex data management and unnecessary bottlenecks.

We must look beyond the traditional organizational boundaries to integrate our processes and data with those of our customers, suppliers, other business partners, and regulatory agencies. We must carefully consider the inevitable transformation that such

integration will have on our traditional relationships as we move from an adversarial position to one of mutual cooperation.

A PROCESS MODEL

In our model, functional specialists continue to operate in their various organizations. The marketplace continues to thrive. However, in both the public and private sectors, organizations still take more time than is necessary to perform a series of specialized tasks. That excess time is associated with specialization and excessive paperwork. The new EC relationship offers the potential for efficiencies by encouraging changes in the way that information is exchanged.

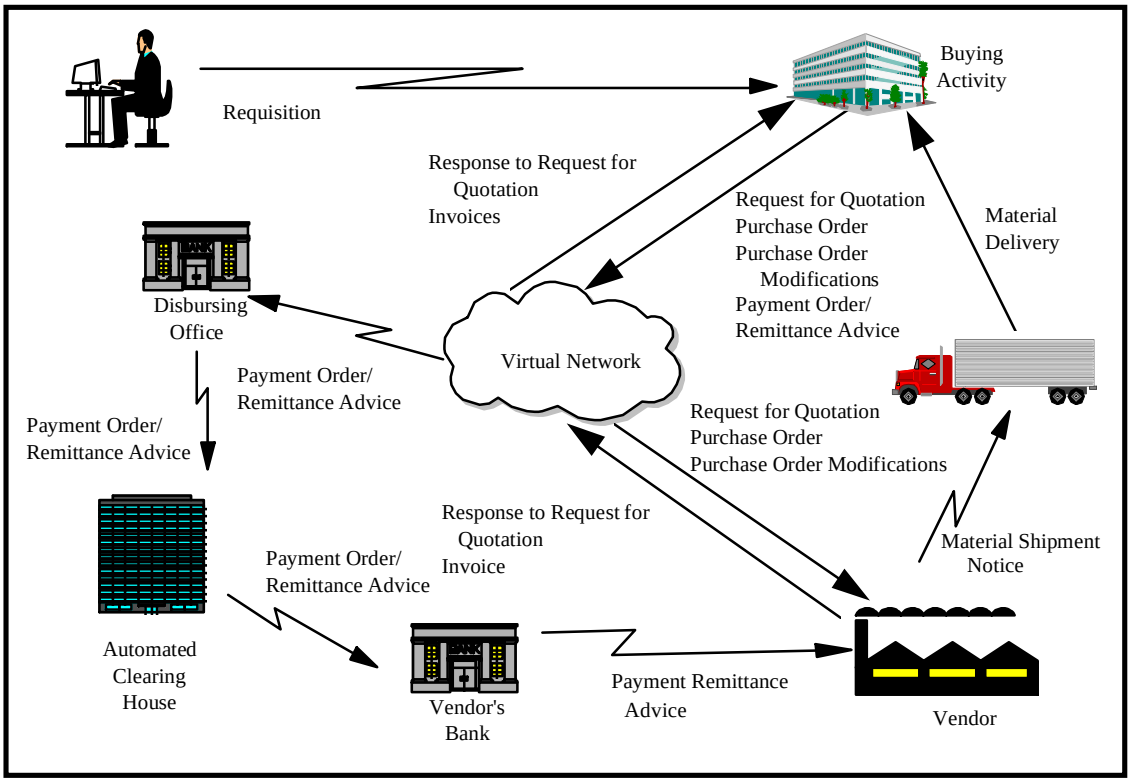


Figure 1. A Process Model

Figure 1 reflects our vision of the public sector/government integrated organization: requirements for supplies and services are identified to a buying organization, orders are placed with a supplier, materials and services are provided to the government, invoices are compared to receipt information and certified for

payment or are eliminated altogether, and funds are disbursed as payment for the goods and services.

All transactions are processed electronically through integrated application programs that recognize the incoming order, receipt, and acceptance of the product. Many of the routine evaluation and processing decisions are conducted by our application programs. Individual contracting officers need no longer concern themselves with administrative paperwork processes. Rather, within the context of a streamlined acquisition operation, they can focus on quality, evaluation and award.

IMPERATIVES

Implementation of EC in the Federal government must meet the following five imperatives:

- The Federal government must present one face to industry.
- Transactions must be standardized, timely, accurate, and reliable.
- The Federal government should use established commercial practices and products where effective.
- Federal, international, and national standards must be used.
- Processes must be automated.

Effective commerce between the Federal government and the private sector must be completed accurately and reliably, using accepted standard business transactions. Potential suppliers often have little incentive to deal with the Federal government's inefficient paper-based procurement systems. The private sector perceives these existing systems as antiquated, cumbersome, slow to react, and slower yet in paying for delivered goods and services.

In today's environment of distributed data bases and inexpensive, instant telecommunication, suppliers should be able to register one time for all Federal government acquisitions. For the same reason, appropriate departments and agency acquisition information that suppliers need should be readily available to them. Implementing these fundamental changes will make possible full-and-open competition and access by all businesses to the government's $200 billion annual market.

"A blizzard of paper" barely describes the volume and variety of paper documents that are currently used to transact business between the government and its suppliers. The labor and time required to key and rekey information into computer systems and file and store all this paper is substantial. This largely human-processed information system is the single, largest source of excess time spent in the acquisition process. Implementing EC will encourage organizations to carefully examine their existing processes and to reengineer them to eliminate many unnecessary steps and to automate many of those that remain.

KEY RECOMMENDATIONS

With this report we begin 3 years of intensive effort to change how we do business in the Federal government's acquisition process. For this effort to be successful, executive departments and agencies must commit the necessary resources and get the government work force and our supplier base involved. We must transform the habits, culture, and performance of all Federal government acquisition activities. To this end, we recommend that executive departments and agencies take the following key actions:

- Coordinate and harmonize appropriate portions of their policies, practices, procedures, and systems so that they present a "single face" to the private sector for all aspects of Federal government acquisition.
- Pursue the implementation of EC in two phases: first, a near-term approach to implement an initial core capability by September 30, 1994, to conduct some of their business by EC; and second, by January 1997, implement EC throughout the Federal government for all appropriate Federal government purchases.
- Organize and use resources to conduct acquisition and related financial transactions over a "virtual network" that will link all appropriate buyers and sellers in an electronic marketplace.
- Participate with OFPP and the President's Management Council Electronic Commerce Task Force by developing individual agency plans for implementing EC in acquisition in accordance with the President's memorandum of October 26, 1993.

- Participate in and provide resource support to the Federal Electronic Commerce for Acquisition Program Management Office (ECA-PMO), which will be established. That office will be tasked to do the following:
  - Develop and coordinate the programs that will support EC throughout the government (e.g., training, metrics, vendor surveys)
  - Coordinate and monitor the progress of actions assigned to a lead agency (in this report) to assure their timely accomplishment
  - Provide assistance to OFPP in monitoring the individual agency plans for implementing EC.

In the following sections we provide a description of the actions needed to implement EC along with specific recommendations to achieve that functionality. We also describe in nontechnical terms the "standard infrastructure" that represents a new or reengineered business model for conducting EC. In adopting this model, departments and agencies will not only retain but enhance their acquisition mission capability in anticipation of tomorrow's limited staff resources.

FUNCTIONAL REQUIREMENTS

In addressing the functional requirements essential to our objective, we consider all related business processes as well as the necessary supporting infrastructure. Federal acquisition must be operated within the context of sound business practices as supported by enabling technology. Accordingly, the following requirements must be satisfied if we are to meet the objectives of the President's memorandum, *Streamlining Procurement Through Electronic Commerce.* We begin by stating the requirement and follow that with an analysis of the requirement and specific recommendations that will enable the departments and agencies to implement EC within the Federal government.

SINGLE FACE TO INDUSTRY

***Requirement*:** We must simplify and standardize the process of conducting business with the Federal government by eliminating the need for suppliers to deal with numerous buying office processes, complete a variety of forms, and comply with differing rules and processing specifications.

Analysis: Many departments and agencies have already implemented or begun to implement EC. Each organization invents a slightly different version of what the other organizations have already implemented. In doing so, the trading partners have to deal with a new way of doing business for each of these organizations. The overall benefits of developing a standard approach to EC for the Federal government and its trading partners will far outweigh any adjustments required to existing systems and practices.

Recommendation: The Federal government must eliminate procedural ambiguities and provide efficiency opportunities to all trading partners by adopting the following:

- A single way and time for a supplier to register to do business
- A standard minimum set of electronic acquisition transactions
- A standard set of guidelines defining the data to be used in electronic transaction exchanges
- A standard trading partner agreement for use with all trading partners
- A single method of providing RFQs to trading partners and allowing access to all Federal government RFQs through one entry point using VANs
- A standard VAN agreement and certification testing methodology
- A consistent outreach program to industry.

TRADING PARTNER REGISTRATION

Requirement: We must establish a government-wide data base of trading partner information to eliminate duplicate supplier registration files throughout the Federal community. We must also have a unique supplier numbering scheme.

Analysis: By collecting information once early in the registration phase, future EDI-based business activities can be focused on the purchase transaction. The trading partner registration data base covers basic business information, business capabilities, and financial information. We want to link that information to past performance and to existing supply, procurement, and financial files by using a unique supplier numbering scheme. To that end, we conducted an extensive

evaluation of government and private-sector numbering schemes: the Contractor Establishment Code (CEC), Data Universal Numbering System (DUNS®) number, taxpayer identifying number (TIN), Commercial and Government Entity (CAGE) code, and other commercial codes. Of these numbering schemes, the DUNS® number was the best: it is a widely used domestic and international commercial identification number for electronic commerce (54 U.S._industries and the United Nations use DUNS® for EDI); it is supported by a worldwide data collection program that focuses on maintaining an accurate data base of unique identification numbers (35 million numbers assigned worldwide); it is a validated numbering scheme ($300 million spent annually to validate its accuracy as contrasted to TIN, which is not validated); it has worldwide support for numbering and positive identification of entities; its numbers are assigned to the lowest possible organizational business level (far lower than the TIN, which is a higher organizational control number); and it is issued at no cost to the Federal government or trading partner. Furthermore, the DUNS® number can be crosswalked against the other existing numbering schemes and can serve as a pointer to the data stored according to another numbering system. That feature is particularly important for relating information between existing and new data bases and for building reliable links to firms' financial data that are stored according to the TIN.

Recommendation: The government-wide data base will serve as a single trading partner information source for acquisition and financial systems. It will store data on trading partners by DUNS® number and TIN and permit cross-referencing to CASE, CEC, and PASS information. In support of a "single face to industry" concept, all suppliers will register once at a single source where the information will be distributed to all users. We recommend the DUNS® number because of its universal use in industry and government, nationally and internationally, as a unique supplier identifier and because it is the only reliable mechanism for crosswalking to other numbering systems. Dun and Bradstreet has offered the Federal government a perpetual license to use the DUNS® number at no cost. We also recommend that the TIN, CAGE, and CEC numbers be collected, validated, and stored in the vendor registration data base and that they be cross-referenced with the DUNS® number.

IMPLEMENTATION CONVENTIONS

Requirement: We must minimize the need for our trading partners to reprogram their systems or purchase different software to handle each agency's procurement system data structure.

Analysis: Agencies using EC have their own implementation conventions (ICs). (Conventions are subsets of a standard. They provide efficiency while still allowing variations required by industry, procurement type, or other variables.) Although all these implementations are based on standards, variations result from interpretation or an attempt to incorporate the requirements of agency-specific application systems. Multiple implementations are inefficient for both the trading partner and the government. At ECAT's request, agencies recently identified data required from the supplier or by the supplier to complete acquisition transactions. By focusing on these external requirements, we will reach consensus and develop a single Federal IC for each transaction.

Recommendation: Develop Federal ICs to provide a single face to industry and from industry to government. Establish a process to maintain these ICs and develop new ones as required by the expansion of EC into large purchases as well as into functional areas beyond acquisition.

STANDARD TRADING PARTNER AGREEMENT

Requirement: We must establish operating and procedural guidelines for the electronic exchange of business information between the government and its trading partners.

Analysis: There is no government-wide standard trading partner agreement (TPA) format. Agency and individual procurement offices are now developing their own TPA format. As EC use expands in the government, the trading partner community is faced with the prospect of many different TPAs. A plethora of agreements is contrary to "a single face from the government." The trading partner community will want a standard agreement format from the government to eliminate the need for tracking and conforming to variation among the many Federal agencies. The standardized terms and conditions of the TPA should be broad enough to accommodate the majority of the operating and procedural requirements. The TPA defines those EDI transactions that will be used and EDI procedures, terms, and conditions. An electronic acknowledgment is required. The TPA

will be accessible to the trading partners via the VANs. Revisions will be communicated to and acknowledged by the trading partners.

Recommendation: The ECAT-developed TPA for EC should be circulated for comment and the revised version adopted as the operating and procedural guidelines for the Federal government and its trading partners.

MASTER SOLICITATION

Requirement: We must reduce the cost of contract formulation and streamline data flows without losing information if we are to provide a "single face to industry" while achieving minimal transmission costs.

Analysis: We compared uniquely created contracts containing a proper but wide variety of clauses against master solicitations that referenced standard clause sets. These master solicitations provide commonality, efficiency, and low transmission costs.

***Recommendation*:** Adopt the use of standardized, government-wide master solicitation and contract packages and incorporate them by reference within each transaction.

CONSISTENT USE OF STANDARD FEDERAL ACQUISITION REGULATION CLAUSES

Requirement: We must streamline and standardize contract content to the maximum practicable extent.

Analysis: The Federal Acquisition Regulation (FAR) provides standard clauses and provisions with limited alternatives and limits on duplication and variation by departments and agencies. We conclude that failure to use the standard FAR clauses and provisions jeopardizes the single face to industry, complicates the acquisition process for the government and its trading partners, increases the cost of goods and services, and lengthens procurement lead time.

Recommendation: The government-wide use of the standard FAR clauses and provisions must be strengthened to promote efficiency and a "single face to industry."

STANDARD REQUIREMENTS FOR VALUE ADDED NETWORKS

Requirement: We must provide a standard set of technical requirements and communication protocols and have a way of validating the technical competency of VANs. In addition, we must provide an easy method for obtaining VAN services for the Federal government.

Analysis: We met with representatives of the VAN industry to discuss their views on Federal government use of EC and reviewed the work DoD has done in this area. We have completed a draft document, *Technical Requirements for EDI VAN Providers,* that will be distributed to government agencies and industry groups for comments. In addition, we have developed a *Certification Agreement for EDI VAN Services* that outlines the terms and conditions of doing business with the government. With assistance from the DoD Electronic Commerce Program Manager, we are drafting a standard test plan and procedure for testing VANs. The Federal government will officially certify VANs as EDI providers after successful completion of the certification test.

Recommendation: Adopt a standard set of government-wide technical requirements for VANs. VANs must demonstrate technical competency by passing a government sponsored test.

***Agency Actions*:** Four actions must be taken in preparing a standard requirement for VANs: finalize the technical requirements and VAN certification agreement, recruit VANs to participate in the Federal EC program, conduct a study on the cost of VAN services, and determine whether VAN services should be acquired using a multiple award schedule procurement.

ELECTRONIC COMMERCE BEYOND EDI

Requirement: We must provide full EC capability that accommodates a range of procurement activities, including the ability for oral and written clarifications. The EC architecture needs to provide for a wide sweep of electronic communication means appropriate to the activities.

Analysis: Procurement involves a variety of activities, including sending standard business transactions such as purchase orders, talking and negotiating with suppliers, and sending written correspondence. In addition to the existing and evolving EDI

standards and mechanisms, electronic mail (E-mail), addressing and directory services, fax and voice messaging systems are used today. Groups (both formal and informal) are looking into providing for the union of interpersonal electronic communications, such as E-mail with interprocess electronic communications, such as EDI. We are currently evaluating the use of E-mail in our EC environment as a means of communication. In addition, we are working with VANs to identify EC requirements and value-added services, such as EDI to fax, to accommodate all EDI-capable and non-EDI-capable trading partners to allow full electronic capability.

Recommendation: The architecture we develop must support all aspects of EC, including E-mail, directory services, EDI to fax, and common data bases.

Agency Actions: The actions required in this recommendation will be assigned to the lead agencies responsible for the technical infrastructure.

CROSS AGENCY COOPERATION

***Requirement*:** We must ensure that the reengineering of agency systems provides access to a series of common data bases (e.g., Supplier Registration; Department of Labor Wage Determinations; List of Parties Excluded from Federal Procurement or Nonprocurement Programs; and Indirect Cost Rate Agreements) that are used by all agencies.

Analysis: The ECAT identified common data requirements to support government acquisition and financial systems. In order to provide economical and timely access to common or shared data, a physically distributed but logically centralized data base concept was defined. Furthermore, the actual information flow was defined to ensure ECAT's technical architecture provided agencies the necessary connectivity and access to meet requirements. Information flow was defined between generic intraagency systems as well as interagency systems. The ability to comply with regulations and other legal requirements was verified by analyzing timeliness, security, privacy, data availability, and interagency connectivity. These data base improvements, though not on the critical path for EC implementation, are critical to capturing many process improvement benefits over the longer run.

Recommendation: The architecture must ensure that a shared, relational, distributed data base infrastructure is available to support agency application programs in accessing, creating, and updating data used by all acquisition offices (see Figure 2).

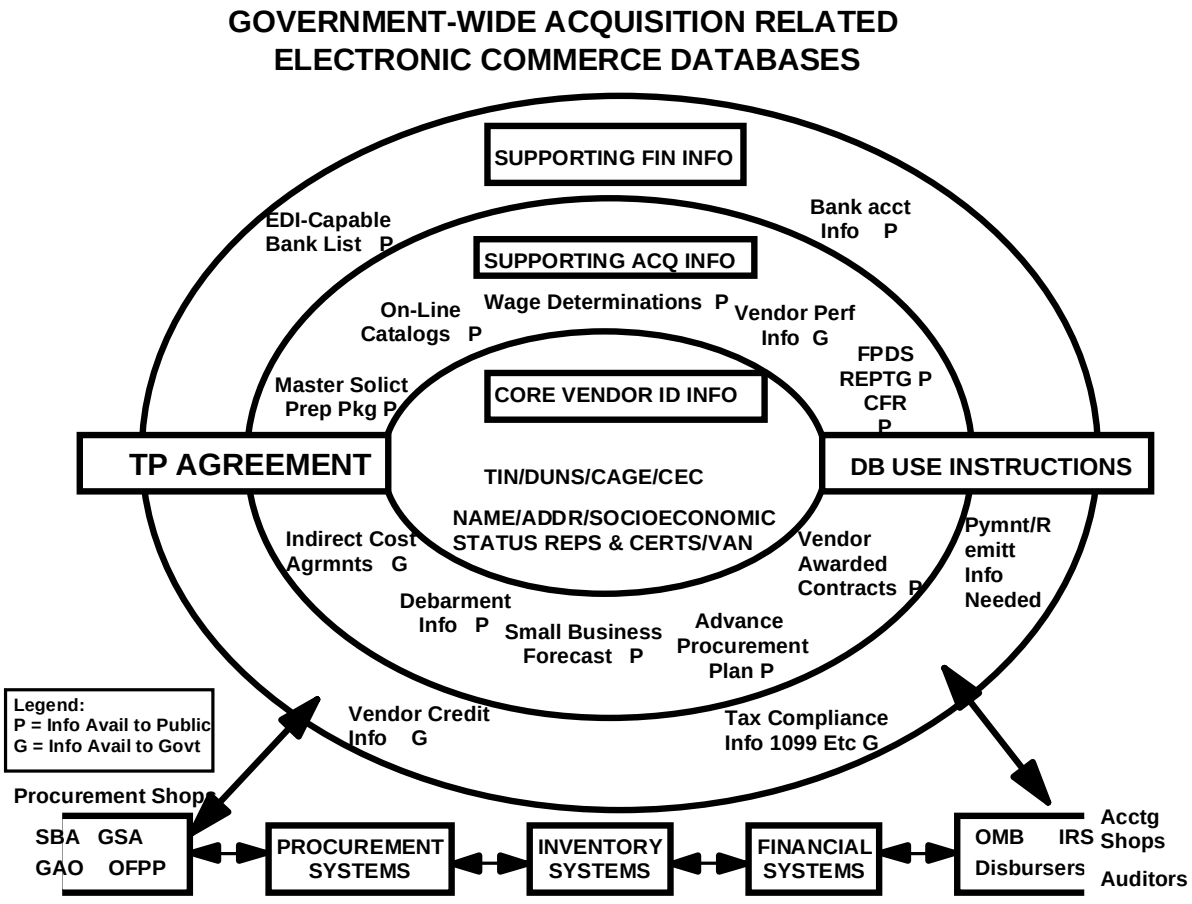


Figure 2. Government-wide Acquisition-Related Electronic Commerce Data Bases

STREAMLINING FINANCIAL SYSTEMS

Requirement: We must eliminate the complex, paper-oriented, and primarily manual process involved with the payment of supplier invoices. We must also eliminate penalties the government must pay as a result of protracted processing delays. We must develop the ability to adjust payment timing to negotiate

additional discounts. Suppliers must receive payments from the government via EFT.[6]

Analysis: Much unnecessary work is generated by current manual, paper-intensive systems built around paper check payments, purchase orders, invoicing, and receiving reports. In an EC world, payments will be made faster and more accurately and reconciliation will be done automatically and expedited by matching standard electronic documents.

Recommendation: As a near-term solution, suppliers should be required to submit electronic invoices and to receive payment by EFT. As a longer term solution, the government should eliminate invoices and pay on receipt of goods. That procedure will require automation of receiving systems with linkages to purchase orders and accounting systems.

OUTREACH PROGRAM

Requirement: Included in the objectives of the President's memorandum on *Streamlining Procurement though Electronic Commerce* is one to "provide businesses, including small, small disadvantaged, and women owned businesses, with greater access to Federal procurement opportunities." We believe that objective is an important part of the EC acquisition program and requires the Federal government to actively solicit participation by the small businesses.

Analysis: The current efforts to involve the supplier community in an EC system are uncoordinated and conducted by a number of departments and agencies involved in EC today. Their focus is on the existing trading partners and is limited in scope.

Recommendation: A consistent and active program is required to assure that all interested suppliers understand how to participate in the Federal-wide EC program.

[6] The Department of the Treasury, Financial Management Service, issued a final rule on January 31, 1994, 59 FR 4536, requiring the use of EFT. See 31 CFR 206 Management of Federal Agency Receipts, Disbursements, and operation of the Cash Management Improvement Fund.

AGENCY APPLICATION SYSTEMS

***Requirement*:** Application systems must provide the end user with a standardized, transparent capability to use EC in the creation and processing of electronic transactions. The agency's applications must be structured to support both EDI and non-EDI data exchanges. Many applications will always require both types of exchanges, and most, if not all, will need the dual capability during transition to EDI. Furthermore, agency applications must use common and shared data to economically and effectively provide a single face to industry. Additionally, EC systems will require implementation of auditing and control mechanisms.

Analysis: ECAT defined a technical architecture support data exchange among applications using EDI. Then, using today's technology, it defined generic scenarios to identify and verify the essential infrastructure and services needed to support an EDI environment. The approach requires the government to enter into agreements with trading partners, VANs, and agencies to accommodate the required coordination and services. Standard agreements have been defined to achieve these goals. The supporting infrastructure for EDI requires purchasing software and/or hardware for ASC X12 translation, and data bases, computers, and communications services. ECAT has identified information flows, specific functional requirements, professional expertise, hardware and software, and available and proven technologies for agency implementations of generic government EC applications.

Recommendation: Application systems should maximize the use of the EC architecture. Maximum benefits will be attained from the use of EC if the implementation is comprehensive and data are entered once and logically have a single storage location.

SECURITY

***Requirement*:** We must ensure that methods used to reduce risk are commensurate with the level of threat involved. Senior managers must seek the proper balance between costs incurred to secure the information and the need for greater access to information.

Analysis: The technical infrastructure must provide the technology that gives business managers confidence in the availability and reliability of the information they need.

Technology offers many solutions (e.g., public key encryption, digital signatures) for managing threats to integrity. Each component of the architecture offers opportunities to enhance the overall integrity of the information. Over the short run, agency-shared strategies are capable of generating adequate security since transactions will be primarily for small dollar amounts for which agency systems can maintain adequate controls. Over the long run, however, a detailed security architecture must be built to accommodate the needs of the larger system. In particular, we must be able to deploy a public key infrastructure to support transactions across multiple networks.

***Recommendation*:** Deploy systems that can adapt easily to changing security policies and at the same time ensure that the following actions are taken:

- Security planning is included early in the acquisition and development of reengineered systems and processes
- Security does not become the excuse for inaction
- Trading partner agreements describe the security requirements
- Security and contingency planning are consistent with expected risk.

TRANSACTION DISTRIBUTION

Requirement: We must streamline and standardize the expensive, time-consuming process of distributing acquisition documents while maintaining sufficient flexibility within the EC architecture to meet individual business requirements.

Analysis: Contracting officers may choose from a variety of contracting methods to provide contracting support. A delivery order and purchase order require different distribution procedures, and the government infrastructure must cope with each of them. As EC is expanded to include solicitations and contracts, flexibility becomes even more important. Transaction sets within these procurement vehicles require flexibility in the electronic distribution system.

Recommendation: The architecture will provide the capability to exchange data within a one-to-one relationship between two specific trading partners, a one-to-all relationship involving the

distribution to all interested parties, and a one-to-specific (i.e., one-to-a-list) relationship involving the distribution to selected parties.

SUPPLEMENTAL DATA TRANSMISSION

Requirement: We must develop the ability to process more complex documents containing drawings, charts, technical specifications, and textual data in an electronic environment.

Analysis: Many standard procurement documents require supporting documents such as graphs, charts, and text. Standard ASC X12 procurement documents do not allow for this additional material. However, two transaction sets, Specifications/Technical Information (841) and Text Message (864), can be used to transmit this information. The need to support these transaction sets is identified as a technical requirement for VANs in the *Technical Requirements for EDI VAN Providers* document. DoD is currently working with VANs in defining implementation conventions for binary files.

Recommendation: The architecture will support the transmission of standard ASC X12 transaction sets used to exchange binary and ASCII (American Standard Code for Information Interchange) files. Capability of relating various EDI documents must be explored to guarantee that the trading partner can associate binary and text attachments with the relevant procurement document.

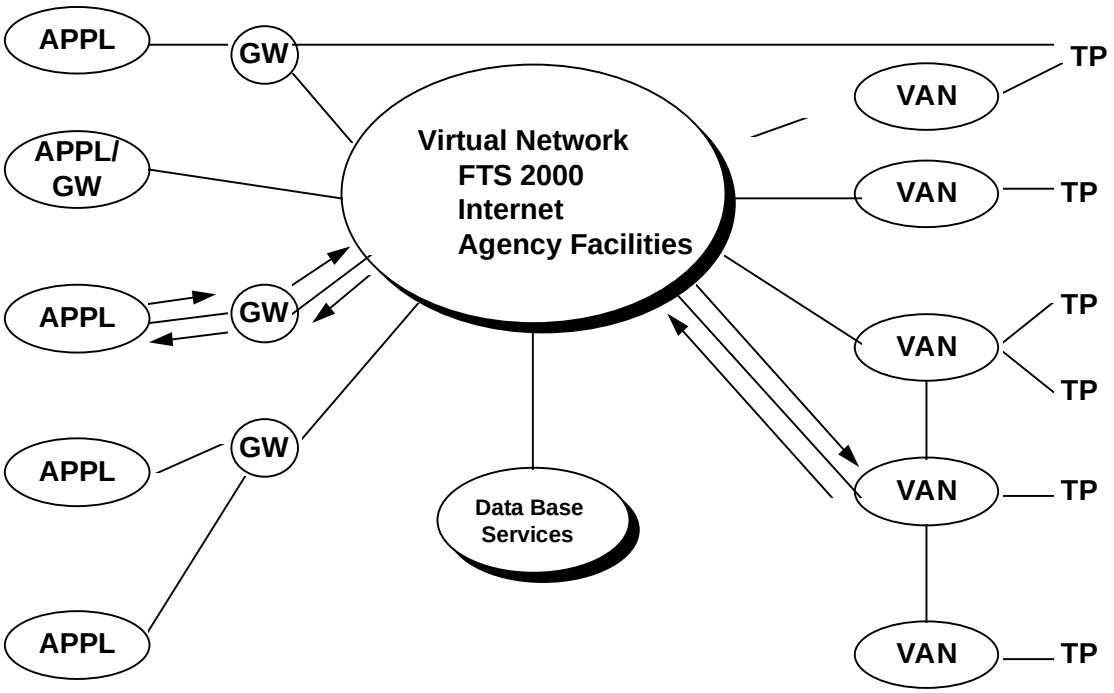
TECHNICAL INFRASTRUCTURE

Requirement: The technical architecture required to support EC must include a telecommunications capability that is efficient, reliable and capable of accommodating the anticipated increasing volume of EC traffic. The technical architecture must ensure easy and equitable access for all agencies and trading partners alike. The access to standard common data bases, such as trading partner registration, with the appropriate levels of security is a critical component of the technical architecture.

Analysis: The Federal EC technical architecture includes the interface to and from agencies and their applications, EDI gateway services, the "virtual network" (communications services), VANs, and trading partners and their applications. The "virtual network"

includes services and functions provided by interconnected already available networks that are in use by the agencies.

Recommendation: The government-wide technical architecture must provide gateways and network entry points (NEPs) that serve as high-speed telecommunications links with commercially operated VANs that ensure universal access to appropriate information and data. The technical architecture should interconnect already available networks within the Federal government. Figure 3 shows the major components of the EC architecture for the Federal acquisition process.



Note: APPL = agency application, GW = gateway, VAN = value-added network, and TP = trading partner.

Figure 3. Technical Architecture - Electronic Commerce for Acquisition

The EC architecture was developed on the following five guiding principles:

- A single face to industry
- Standards-based open system
- Best commercial practices
- Security based on need
- A cost-effective transition.

Our ultimate goal for the architecture is to free EC from proprietary agency systems and make the transition to a single interconnected, interoperable, standards-based internetworking environment.

To implement an EC infrastructure, we must establish NEPs to exchange transactions with the VANs used by trading partners. Trading partners may use any of the VANs that have been EDI certified by the government, or the trading partner may choose to become EDI certified as a VAN on its own behalf.

Trading partners will send and receive information to and from NEPs via their EDI VAN. Executive departments and agencies will transmit data to the NEPs, which will forward the data to the appropriate VAN. The EC infrastructure will support all distribution requirements for transactions sent to each of the participating VANs via an NEP. VANs will make these public transactions available to all interested subscribers.

PROGRAM MANAGEMENT OFFICE

Requirement: A Federal ECA-PMO must be established and given the mission of providing government-wide support, coordination, and monitoring of progress in reaching the goals established in the President's memorandum of October 26, 1993.

Analysis: A number of tasks must yet be completed in establishing the "single face to industry" and a standard EC system within the Federal government. Completing those tasks will require an organization to serve as the coordinator, developer of common support programs, and monitor the assignments given to lead agencies by this report. A program management office with

government-wide visibility of the EC program would best serve to fill this requirement.

Recommendation: The ECAT recommends that a Federal ECA-PMO be chartered to develop and coordinate the programs that will support government-wide EC and support OFPP's oversight of the program.

CONCLUSION

This is the time for leadership. We must embrace technology and begin the process of developing the necessary architecture as the only means of assuring that our acquisition processes will be managed in a healthy, competitive environment. The paradigm shift demands that we carefully examine our business processes, reengineer them as necessary, and review existing procedures, strategies, and systems if we are to meet our imperatives: working better and costing less. Process standardization and the expectations of accurate, timely and quality data should be our watchwords. Finally, we must put in place a responsible organization and empower it with the authority and resources to manage the change process.

The analyses and recommendations are addressed in more detail in the main body of the report.